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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 09/523,446 | 03/10/2000 | Qiming Chen | 10991148-1 | 5325 |

22879 7590 09/10/2002

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| EXAMINER |
|---|
| WU, YICUN |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2175 | |

DATE MAILED: 09/10/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/523,446 | CHEN ET AL. | |
| | Examiner | Art Unit | |
| | Yicun Wu | 2175 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *10 March 2000* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *2-18,20,22-25 and 27-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-14, 16-18,20,22-25 and 27-30* is/are rejected.

7)☒ Claim(s) *15* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

## III. DETAILED ACTION

1. Claims 2-18, 20, 22-25 and 27-30 are presented for examination.

2. Applicant's arguments submitted on 8-23-2002 with respect to claims 2-14, 16-18, 20, 22-25 and 27-30 have been reconsidered but are not deemed persuasive for the reasons set forth below.

### Response to Applicant' Remarks

3. Examiner has completed a through study of Applicant's amendment of August 23, 2002.

4. Especially, Applicant's amendments to claims 2-14, 16-18, 20, 22-25 and 27-30 and remarks at pages 10-16 of the Amendment of 8-23-2002 has been carefully studied and reviewed.

5. Applicant's amendments to claims 2-14, 16-18, 20, 22-25 and 27-30 further direct the claimed invention into a system for reporting network events using hierarchically structured event databases in a distributed computing environment.

6. Examiner has carefully and thoroughly studied and reviewed Applicant's amendment of 8-23-2002. Examiner asserts that Han in

combination with Tuzhilin and further in combination with Fawcett teaches Applicant's claimed invention of a method for detecting telecommunication fraud performed in a data processing system having a data warehouse and an OLAP server.

In addition, the specially discussed feature of the claimed invention ("telecommunication fraud") is very clearly discussed in Fawcett (abstract and Fig. 5).

In addition, the specially discussed feature of the claimed invention ("telecommunication fraud") is very clearly discussed in Fawcett (abstract and Fig. 5).

Examiner asserts that Han in combination with Tuzhilin and further in combination with Fawcett teaches Applicant's claimed invention of a method for detecting telecommunication fraud performed in a data processing system having a data warehouse and an OLAP server.

7. Applicant is inaccurate for the reasons explicitly stated in the first Office Action. Examiner asserts that Han in combination with Tuzhilin and further in combination with Fawcett teaches Applicant's claimed invention of a method for detecting telecommunication fraud performed in a data processing system having a data warehouse and an OLAP server.

8. These reasons have been explicitly stated in the first Office Action. Please see the next section.

## *Claim Rejections - 35 USC § 103*

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 2, 4-14, 16-18, 20, 22-25 and 27-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jiawei Han, ("Towards On-Line Analytical Mining in Large Databases," ACM SIGMOD Record, 27:1, pp. 97-107, 1998 and Han hereinafter), in view of Tuzhilin (U.S. Patent No. 6,236,978 B1) further in view of Fawcett et al. (U.S. Patent No. 5,790,645 B1) (and Fawcett hereinafter)

Regarding Claims 27, 14 and 28, Han teaches a method performed in a data processing system having a data warehouse and an OLAP server, the method comprising:

retrieving a plurality records from data warehouse (i.e. database) (Fig. 1, page 3 paragraph 4);

generating a calling profile cube (i.e. data cubes) based on the call records; wherein the calling profile cube includes information on multiple customers (Fig. 1, page 3 paragraph 4);

Han does not teach generating a volume-based calling pattern cube for each individual customer based on the multi customer calling profile cube;

comparing the volume-based calling pattern cube for each customer to a predetermined fraudulent volume-based calling pattern; and

when the volume-based calling pattern cube is in a first predetermined relationship with predetermined fraudulent volume-based calling pattern, performing a first action.

Tuzhilin teaches generating a volume-based calling pattern cube for each individual customer based on the multi customer calling profile cube (See Fig 1,2, 3) (Tuzhilin column 3, line 40-41);

comparing the volume-based calling pattern cube for each customer to a predetermined fraudulent volume-based calling pattern (See Fig 1,2, 3) (Tuzhilin column 11, line 65) (Tuzhilin column 3, line 40-41); and

when the volume-based calling pattern cube is in a first predetermined relationship with predetermined fraudulent volume-based calling pattern, performing a first action (Tuzhilin

column 12, line 1-3) (See Fig 1,2, 3) (Tuzhilin column 11, line 65) (Tuzhilin column 3, line 40-41).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Han to include: generating a volume-based calling pattern cube for each individual customer based on the multi customer calling profile cube;

comparing the volume-based calling pattern cube for each customer to a predetermined fraudulent volume-based calling pattern; and

when the volume-based calling pattern cube is in a first predetermined relationship with predetermined fraudulent volume-based calling pattern, performing a first action.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Han by the teaching of Tuzhilin to include: generating a volume-based calling pattern cube for each individual customer based on the multi customer calling profile cube;

comparing the volume-based calling pattern cube for each customer to a predetermined fraudulent volume-based calling pattern; and

when the volume-based calling pattern cube is in a first predetermined relationship with predetermined fraudulent volume-

based calling pattern, performing a first action, with the motivation to more efficiently serve the user as taught by Tuzhilin (See column 1, line 22-26) and in order to detect any abnormal activities.

Han does not teach detecting telecommunication fraud.

Fawcett et al. teaches detecting telecommunication fraud (abstract and Fig. 5).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Han to include: detecting telecommunication fraud.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Han by the teaching of Tuzhilin to include: detecting telecommunication fraud, with the motivation to more effectively generating a fraud detection system in a relatively brief time frame so that the fraud detection system is well adapted to current fraudulent schemes as taught by Fawcett (See column 2, lines 46-52).

Regarding claim 2, Han as modified does not teach retrieving records from the call table and based thereon generating a snapshot cube representing the records from the call table, the snapshot cube having predetermined dimensions;

retrieving records from the profile table and based thereon generating a profile cube representing the records from the profile table, the profile cube having predetermined dimensions that are the same as the dimensions of the snapshot cube; merging the snapshot cube and the profile cube to generate an updated profile cube and deriving a volume-based calling pattern based on the updated profile cube.

Tuzhilin teaches retrieving records from the call table (i.e. transaction data, See Tuzhilin column 3, line 40-41) and based thereon generating a snapshot cube representing the records from the call table, the snapshot cube having predetermined dimensions (See Tuzhilin column 6, line 1-7); retrieving records from the profile table (i.e. static profile, Tuzhilin column 3, line 40-41) and based thereon generating a profile cube representing the records from the profile table (See Tuzhilin column 7, line 60-63), the profile cube having predetermined dimensions that are the same as the dimensions of the snapshot cube (i.e. having corresponding properties, See Tuzhilin column 4, line ); merging the snapshot cube and the profile cube to generate an updated profile cube (See Tuzhilin Fig 2, item 25) and deriving a volume-based calling pattern based on the updated profile cube (See Tuzhilin Fig 1, item 3).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Han to include: retrieving records from the call table and based thereon generating a snapshot cube representing the records from the call table, the snapshot cube having predetermined dimensions; retrieving records from the profile table and based thereon generating a profile cube representing the records from the profile table, the profile cube having predetermined dimensions that are the same as the dimensions of the snapshot cube; merging the snapshot cube and the profile cube to generate an updated profile cube and deriving a volume-based calling pattern based on the updated profile cube.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Han by the teaching of Tuzhilin to include: retrieving records from the call table and based thereon generating a snapshot cube representing the records from the call table, the snapshot cube having predetermined dimensions; retrieving records from the profile table and based thereon generating a profile cube representing the records from the profile table, the profile cube having predetermined dimensions that are the same as the dimensions of the snapshot cube; merging the snapshot cube and the profile cube to generate an updated

profile cube and deriving a volume-based calling pattern based on the updated profile cube, with the motivation to more efficiently serve the user as taught by Tuzhilin (See Tuzhilin column 1, lines 22-26) and in order to detect any abnormal activities.

Regarding claims 3 and 28, Han as modified teaches a method wherein the step of when the probability-based calling pattern cube is in a first predetermined relationship with predetermined fraudulent probability-based calling pattern, performing a first action includes one of:

flagging a particular caller with the probability based calling pattern being analyzed as suspicious (Fawcett abstract Fig 3-5);

automatically generating an alert that specifies callers with suspicious probability-based calling pattern (Fawcett abstract Fig 3-5);

performing further investigation on callers with suspicious probability-based calling pattern (Fawcett abstract Fig 3-5);

cancellation of telephone services for callers with suspicious probability-based calling pattern (Fawcett col. 7, lines 30-32); and

performing other appropriate remedial actions (Tuzhilin col. 12, lines 1-3).

Regarding claim 4, Han as modified teaches analyzing the calling pattern cube (i.e. data cube) by utilizing at least one performing OLAP operation on data cubes (See p3, 2.3).

Regarding claim 5, Han as modified teaches OLAP operations is one of a roll-up operation, a drill-down operation, a dice operation, a slice operation (See page 3, 2.3) and an ad-hoc query (i.e. be able to browse conveniently, See p3, 2.2).

Regarding claim 6, Han as modified teaches storing profile cube (i.e. data cube) back into the profile table in the data warehouse (i.e. database, See Fig 1).

Regarding claim 7, Han as modified teaches performing data staging between the profile table (i.e. table reside in database) and the updated profile cube (i.e. data cube) at predetermined interval (See Fig 1).

Regarding claims 8, 11, 22 Han as modified teaches profile cube, snapshot cube, and updated profile cube (i.e. data cubes)

are at least two dimensional and at least two level, and multi-dimensional and multi-level (See page 3, section 2.3).

Regarding claims 9 and 10 Han as modified teaches analyzing calling pattern cube (i.e. data cube) utilizing at least one OLAP operations along more than one level and one dimension (See page 3, section 2.3).

Regarding claim 12, Han as modified does not teach profile table (static profile) and the call table (i.e. dynamic profile) each has a plurality of attributes (See Tuzhilin column 3, line 53, column line 4), and the profile cube and snapshot cube each has a plurality of dimensions (See Tuzhilin column 7 line 59-61, column 6 line 3-7), the attributes corresponding in a one-to-one fashion to the dimensions.

Tuzhilin teaches profile table (static profile) and the call table (i.e. dynamic profile) each has a plurality of attributes (See Tuzhilin column 3, line 53, column line 4), and the profile cube and snapshot cube each has a plurality of dimensions (See Tuzhilin column 7 line 59-61, column 6 line 3-7), the attributes corresponding in a one-to-one fashion to the dimensions (i.e. mapping fields to a multi-dimensional space in

one-to-one fashion)( See Tuzhilin column 5, line 11, column 7, line 60-63).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Han to include: profile table and the call table each has a plurality of attributes, and the profile cube and snapshot cube each has a plurality of dimensions, the attributes corresponding in a one-to-one fashion to the dimensions.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Han by the teaching of Tuzhilin to include: profile table and the call table each has a plurality of attributes, and the profile cube and snapshot cube each has a plurality of dimensions, the attributes corresponding in a one-to-one fashion to the dimensions, with the motivation to more efficiently serve the user as taught by Tuzhilin (See Tuzhilin column 1, line 22-26) and in order to detect any abnormal activities.

Regarding claims 13 and 24 Han as modified teaches profile cube (i.e. data cube) include: at least one cell having probability based value (See page 5, 2nd column, 2nd paragraph).

Regarding claim 16 Han as modified teaches analysis tool for use by a data analyst to perform one of comparing the calling pattern cube to known fraudulent calling pattern cube and extracting information from the calling pattern cube based on selected dimensions, levels, and ad-hoc queries provided by the data analyst (page 4, section 2.4, page 5 section 2.5, page 6 section 2.6) and (See Han page 3, section 2.2).

Han as modified does not teach fraud detection with calling pattern cube.

Tuzhilin teaches fraud detection with calling pattern cube. (See column 13 line 51-52, column 14 line 28-32).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Han to include: fraud detection with calling pattern cube.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Han by the teaching of Tuzhilin to include: fraud detection with calling pattern cube, with the motivation for providing higher quality user profiles which may facilitate better fraud detection as taught by Tuzhilin (See column 2, line 53-57).

Regarding claims 17 Han as modified teaches a visualization tools for use by a data analyst to display the calling pattern cube in different formats, levels and dimensions (See page 3, section 2.2, 6th paragraph).

Regarding claims 18 and 23, Han as modified teaches a data staging tool for transferring data between the profile cube stored in the OLAP server and profile table in the data warehouse at predetermined time intervals (See Fig 1).

Regarding claims 25 and 26, Han as modified does not teach customer profiles wherein the dimension include: a day-of-week hierarchy, a time hierarchy, and duration hierarchy; profile data cube represents a plurality of customers, and the pattern cube represents an individual customer.

Tuzhilin teaches customer profiles wherein the dimension include: a day-of-week hierarchy, a time hierarchy, and duration hierarchy (i.e. purchase), (See column 6, line 13-15); profile data cube represents a plurality of customers (i.e. cust m-dimensional space, See column 7, line 60-62), and the pattern cube represents an individual customer (See fig 3, item 60).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to

have modified Han to include: implementing customer profiles wherein the dimension include: a day-of-week hierarchy, a time hierarchy, and duration hierarchy (i.e. purchase), and profile data cube represents a plurality of customers, and the pattern cube represents an individual customer.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Han by the teaching of Tuzhilin to include: implementing customer profiles wherein the dimension include: a day-of-week hierarchy, a time hierarchy, and duration hierarchy (i.e. purchase), and profile data cube represents a plurality of customers, and the pattern cube represents an individual customer, with the motivation to provide a more useful set of individual rules for each user as taught by Tuzhilin (See Tuzhilin column 2, line 39-40). If the user profiles are generated in a highly relevant and comprehensible manner with respect to a specific user, the applications would be able to understand that user's information better, and more efficiently serve the user, and to detect any abnormal behavior in the system as taught by Tuzhilin (See Tuzhilin column 1, line 22-26).

Regarding claim 20, the limitations of claim 20 has been noted in the rejection in claims 1, 2, 8, 9, 10, 11, 13, 15, 16, 17 and 19 above. It is therefore similarly rejected as set forth above.

Regarding claim 30, Han as modified teaches a method wherein the probability-based calling patterns enables one of the analysis and comparison of a first probability-based calling patterns that covers a first time period with a second probability-based calling patterns that covers a second time-Period. (Han page 7, section 3.4) and (Tuzhilin Fig.3, and col. 2, lines, 41-67) and Fawcett (Fig. 3-5).

***Allowable subject Matter***

11. Claim 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record (Jiawei Han, ("Towards On-Line Analytical Mining in Large Databases," ACM SIGMOD Record, 27:1, pp. 97-107, 1998), and Tuzhilin (U.S. Patent No. 6,236,978 B1) and Fawcett et al. (U.S. Patent No. 5,790,645 B1) does not disclose, teach or suggest the claimed limitations of (in combination with all other features in the claims): detecting telecommunication fraud by comparing known fraudulent profiles to caller pattern cubes; the profile engine further generating a profile cube from information selected from the profile table, generating a snapshot cube, updating the profile cube by merging the profile cube and the snapshot cube to generate art updated profile cube, and deriving a calling pattern cube based on the

updated profile cube; wherein the profile engine is a scalable computation engine that is implemented by OLAP programming supported by the OLAP server, as claimed in claim 15.

## Conclusion

13. **THIS ACTION IS MADE FINAL**, Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory- period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136 (a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply-expire later than SIX MONTHS from the mailing date of this final action.

***Points of contact***

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yicun Wu whose telephone number is 703-305-4889. The examiner can normally be reached on 8:00 am to 4:30 pm, Monday -Friday. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dov Popovici can be reached on 703-305-3830. The fax phone numbers for the organization where this application or proceeding is assigned are 703-746-7238 for regular communications and 703-746-7240 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

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September 6, 2002